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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/657,132	09/09/2003	Ching-Hsu Yang	YANG3150/EM	1902
23364	7590	11/01/2005	EXAMINER	
BACON & THOMAS, PLLC 625 SLATERS LANE FOURTH FLOOR ALEXANDRIA, VA 22314			MITCHELL, JAMES M	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 11/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/657,132	<b>Applicant(s)</b> YANG, CHING-HSU	
	<b>Examiner</b> James M. Mitchell	<b>Art Unit</b> 2813	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 October 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 2 and 18-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. This office action is in response to applicant's election filed October 6, 2005.

#### ***Election/Restrictions***

2. Claims 2 and 18-23 are<sup>1</sup> withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on October 6, 2005.

#### ***Claim Rejections - 35 USC § 112***

3. Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear how the "heat...adhesive [HA]" is between the back of the chip and upper surface of the carrier when applicant's elected species, Fig. 4 shows the HA between a surface of the spreader and back surface of the chip; HA is not between the back of the chip and upper surface of the carrier.

#### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

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<sup>1</sup> Pursuant to 37 CFR 1.121, the correct claim status for each claim must be indicated in the next office action or the application will be considered an intentional non-responsive.

only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 12-14, 16 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Tao (U.S. 6,410,981).

6. Tao<sup>2</sup> (Fig. 7, 8) discloses:

(cl. 1) a thermal enhance semiconductor package, comprising: a carrier (3) having an upper surface and a lower surface opposed to the upper surface; a semiconductor chip (4) having an active surface, a back surface opposed to the active surface and a plurality of bonding pads (i.e. portion of chip in contact with ball, 8) formed on the active surface; a plurality of conductive devices (8), which are formed on the bonding pads and connect the active surface of the semiconductor and the upper surface of the carrier; and a universal heat spreader having a plurality of through holes (10), the universal heat spreader (1; Col. 2, Lines 22-25) disposed on the back surface of the semiconductor chip;

(12) and heat transmission adhesive (e.g. cap able to release heat; item 5,7) formed between the back surface of the semiconductor chip and the upper surface of the carrier (e.g. *interpreted to mean HA between the spreader and back of chip*; Fig. 7);

(cl. 13) a stiffener ring (2) connecting the carrier and the universal heat spreader via a heat transmission adhesive (7);

(cl. 14) with the ring around the chip (Fig.7);

(cl. 16) wherein one of the conductive devices is a conductive bump (8);

(cl. 17) and a plurality of solder balls (6). are formed on the lower surface of the carrier.

7. Claims 1, 3, 12, 15 and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Ro<sup>3</sup> (U.S. 6,6089,380).

8. Ro (Fig. 4, 5,10) discloses:

(cl. 1) a thermal enhance semiconductor package, comprising: a carrier (210) having an upper surface and a lower surface opposed to the upper surface; a semiconductor chip (220) having an active surface, a back surface opposed to the active surface and a plurality of bonding pads (i.e. portion of chip on bottom provides contact with chip; "Flip chip"; CLM 1 of Ro) formed on the active surface; a plurality of conductive devices ("flip chip"), which are formed on the bonding pads and connect the active surface of the semiconductor and the upper surface of the carrier; and a universal heat spreader having a plurality of through holes (244; Fig. 4), the universal heat spreader (240) disposed on the back surface of the semiconductor chip;

(cl. 3) a pin (242) in one hole (Fig. 4);

(12) and heat transmission adhesive (256) formed between the back surface of the semiconductor chip and the upper surface of the carrier (e.g. *interpreted to mean HA between the spreader and back of chip*; Fig. 5);

(cl. 15) a filler (252) disposed between the upper surface of the carrier and the active surface of the semiconductor chip (e.g. bottom portion/ flip chip);

(cl. 16) wherein one of the conductive devices is a conductive bump ("flip chip").

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<sup>2</sup> Likewise Fig. 1, 2A could have been used to reject claim with through-holes, 12 going through a portion

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 3, 8 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tao (U.S. 6,410,981) in combination with Cromwell (U.S. 6,084,178).

11. Tao discloses the elements stated in paragraph 6 of this office action and further a filler (5) disposed between the upper surface of the carrier and the active surface of the semiconductor chip, but does not disclose pins in its holes.

12. Cromwell discloses pins (screws, 17) in holes (Fig. 2).

13. It would have been obvious to one of ordinary skill in the art to further incorporate holes in the lid and ring of Ta in order to further secure the lid to the ring as taught by Cromwell (Fig, 3).

14. Claims 4-7 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tao (U.S. 6,410,981) and Cromwell (U.S. 6,084,178) as applied to claim 3 and 8 and further in combination with Ootsuki et al. (U.S. 5,652,461).

15. Neither Tao nor Cromwell appears to show forming its spreader from copper, aluminum or silver or combination.

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of cap as shown in Fig. 2A.

<sup>3</sup> Likewise other references e.g. Cromwell (U.S. 6,084,178) could have been used to anticipate claim.

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16. Ootsuki (Col. 3, Lines 23-26) discloses a thermal conductor of copper, aluminum or silver.

17. It would have been obvious to one of ordinary skill in the art to form the modified spreader of Tao of copper, aluminum and silver in order to provide high thermal conductivity as taught by Ootsuki (Col. 3, Lines 23-26).

18. Furthermore the claimed material would have been obvious, since it has been held that the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945); See also MPEP 2144.07.

19. Claims 4-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ro (U.S. 6,6089,380) in combination with Ootsuki et al. (U.S. 5,652,461).

20. Ro discloses the elements stated in paragraph 8 of this office action, but does not appear to show forming its spreader from copper, aluminum or silver or combination.

21. Ootsuki (Col. 3, Lines 23-26) discloses a thermal conductor of copper, aluminum or silver.

22. It would have been obvious to one of ordinary skill in the art to form the spreader of Ro of copper, aluminum and silver in order to provide high thermal conductivity as taught by Ootsuki (Col. 3, Lines 23-26).

23. Furthermore the claimed material would have been obvious, since it has been held that the selection of a known material based on its suitability for its intended use

supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945); See also MPEP 2144.07.


### **Conclusion**

24. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art discloses the use of copper, silver and aluminum as heat sinks/spreaders, the use of holes in heat sinks spreaders, and the use of pins through holed in heat sink/spreaders.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (571) 272-1931. The examiner can normally be reached on M-F 8:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

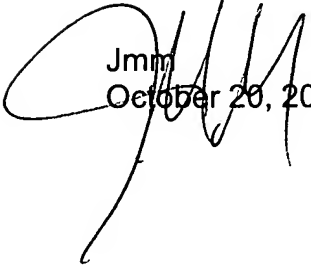
  
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Jmm  
October 20, 2005

A large, stylized handwritten signature in black ink, appearing to be 'Jmm', is written over the typed name and date.